Passaic County Community College
Academic Year: 2024 - 2025
Standard Syllabus

Department Chair: Merille Siegel

Course Code: ES-231 **Course Title: Circuits and Systems I**

Department: CIS/Engineering **Semester Offered: Fall Only**

Course Description:
This course covers the first level of electric circuit theory and system analysis. Topics include basic concepts of electricity, methods of circuit analysis, the natural and step response of passive networks, power, and ideal transformers.

Prerequisites: PY 121

Credits: 3 **Lecture Hours:** 3 **Lab Hours:** 0 **Clinical/Fieldwork Hours:** 0

REQUIRED TEXTBOOK/MATERIALS:
Electric Circuits by Nilsson & Riedel/ Pearson Prentice Hall

ADDITIONAL TIME REQUIREMENTS:
Based on a 15 week semester, students are expected to spend an additional 6 hours per week of work outside of class.

COURSE LEARNING OUTCOMES:
Upon completion of this course, students will be able to:

- Analyze electric circuits using Ohm's law, Kirchhoff's current and voltage law
- Determine the power for each element in electric circuits
- Determine the equivalent resistance of series and parallel network
- Use delta-to-wye equivalent model to solve electric circuits.
- Analyze electric circuits using the Nodal-voltage and the mesh-current methods
- Analyze electric circuits containing inverting, noninverting, summing and difference amplifiers.

- Use the equations for voltage, current, power, and energy in an inductor and capacitor
- Combine inductors/capacitors with initial conditions in series and in parallel to an equivalent circuit
- Determine the natural and step response of RL/RC circuits
- Use the phasor concepts to transform an electric circuit with sinusoidal source into frequency domain
- Analyze electric circuits containing ideal transformers using phasor methods

GENERAL EDUCATION OUTCOMES: This is not a general education course.

GRADING STANDARD:

Component	Weight
3 Exams	60%
Five MultiSim Projects	5%
Class Attendance	5%
Final Exam	30%

COURSE CONTENT: (Schedule and suggested topics, readings, and assignments subject to change based on instructor and instructional resource)
(Topics only. Do not list weekly.)

Week	Topics
1	Basic Concepts of Electricity: Voltage and Current Sources, Ohm's Law, Circuit Models
2	Kirchhoff's Laws, Dependent Sources in circuits
3	Resistance in Parallel and Series connections
4	Current and Voltage Dividers, Concept of Load Resistance, Measurements of Current and Voltage. Wheatstone Bridge, **Test 1.**
5	Circuit Calculations, Node Voltage Method
6	Mesh Current Method, Source Transformations,
7	Norton/Thevenin Equivalents, Maximum Power delivery, Superposition
8	Inductors and Capacitors in Circuits. Mutual Inductance **Test 2.**
9	Operational Amplifier as a Dependent Source Element
10	Sinusoidal Sources, Phasors
11	Passive Elements in Frequency Domain, Node and Mesh Methods of Circuit Analysis, Instantaneous, Average, RMS Power
12	First Order Systems, RL & RC. Natural and Step Response **Test 3.**
13	First Order Systems General Solution with Abrupt Power Change
14	Transformers
15	**Final Exam**

COLLEGE POLICIES: For Information regarding:

- PCCC's Academic Integrity Code
- Student Conduct Code
- Student Grade Appeal Process

Please refer to the PCCC Student Handbook and PCCC Catalog.

Inclement Weather:
In the event of inclement weather and the College is closed, all classes will switch to remote (Zoom) learning. The Zoom link for this course section is has been added here in this document by your instructor. Please also see BlackBoard for further instructions.

PANTHER ALERT:
The college will announce delayed openings, closings, and other emergency situations through the Panther Alert System. Students are encouraged to sign up for Panther Alert Notifications by logging into their student accounts through the PCCC website at www.pccc.edu and following Panther Alert System instructions.

Requesting Reasonable Accommodations at Passaic County Community College: Passaic County Community College Office of Accessibility Services, in accordance with Section 504 of the Rehabilitation Act of 1973, Americans with Disabilities Act (ADA) of 1990, and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008 is committed to providing reasonable accommodations to students with documented disabilities. If you have a disability and believe you need accommodations, please contact the Office of Accessibility Services (OAS) at (973) 684-6395 or email ods@pccc.edu. Students should request accommodations as early as possible, since they may take time to implement.